LAB # 3

DECLARING VARIABLES AND TO TAKE INPUT FROM USER

Building Blocks of Programming Language

In any language there are certain building blocks:

- Operators
- Constants
- Variables
- Methods to get input from user

Operators

There are various types of operators that may be placed in these categories:

Basic: +, - , *, /, %

Power: ^

Assignment: =, +=, -=, /=, *=, %=
(++, -- may also be considered as assignment operators)

Relational: <, >, <=, >= , = =, !=

Logical: && , || , !

Variables and Constants

If the value of an item can be changed in the program then it is a variable. If it will not Change then that item is a constant. The various variable types (also called data type) in C+ are: int, float, char etc.

Variable declaration:

Variable are generally declared as:

Type var-name;

For example:-

int a;
int a,b; int a,b,c;

'int' is the data type and 'a' is a variable name , you can declare more than one variable at a time by using one same data type.

Primitive Built-in Types

C++ offers the programmer a rich assortment of built-in as well as user defined data types. Following table lists down seven basic C++ data types –

Type	Keyword
Boolean	bool
Character	char
Integer	int
Floating point	float
Double floating point	double
Valueless	void
Wide character	wchar_t

Several of the basic types can be modified using one or more of these type modifiers –

- signed
- unsigned
- short
- long

The following table shows the variable type, how much memory it takes to store the value in memory, and what is maximum and minimum value which can be stored in such type of variables.

Type	Typical Bit Width	Typical Range
char	1byte	-127 to 127 or 0 to 255
unsigned char	1byte	0 to 255
signed char	1byte	-127 to 127
int	4bytes	-2147483648 to 2147483647
unsigned int	4bytes	0 to 4294967295
signed int	4bytes	-2147483648 to 2147483647
short int	2bytes	-32768 to 32767
unsigned short int	2bytes	0 to 65,535
signed short int	2bytes	-32768 to 32767
long int	4bytes	-2,147,483,648 to 2,147,483,647
signed long int	8bytes	same as long int
unsigned long int	4bytes	0 to 4,294,967,295
long long int	8bytes	-(2^63) to (2^63)-1

Type	Typical Bit Width	Typical Range
unsigned long long int	8bytes	0 to 18,446,744,073,709,551,615
float	4bytes	
double	8bytes	
long double	12bytes	
wchar_t	2 or 4 bytes	1 wide character

C++ User Input

You have already learned that **cout** is used to output (print) values. Now we will use **cin** to get user input. **cin** is a predefined variable that reads data from the keyboard with the extraction operator (>>).

In the following example, the user can input a number, which is stored in the variable x. Then we print the value of x:

Example

```
int x;
cout << "Type a number: "; // Type a number and press enter
cin >> x; // Get user input from the keyboard
cout << "Your number is: " << x; // Display the input value
```

In this example, the user needs to input two numbers, and then we print the sum:

Example

```
int x, y;
int sum;
cout << "Type a number: ";
cin >> x;
cout << "Type another number: ";
cin >> y;
sum = x + y;
cout << "Sum is: " << sum;
```

Lab Tasks

1- Write a program that take four floating numbers from keyboard and prints their sum, product and average.

2- Write a program to calculate the area of the circle, taking the value of the radius from the user.

3- Write a program that prints to calculate the age in days by using the formula: days = years * 365.

4- Write a C++ program to convert temperature from degree Celsius to Fahrenheit.

```
/* celsius to fahrenheit conversion formula */

fahrenheit = (celsius * 9 / 5) + 32;
```

5- Mention output for following code fragment.

```
cout << "Size of char : " << sizeof(char) << endl;
cout << "Size of int : " << sizeof(int) << endl;
cout << "Size of short int : " << sizeof(short int) << endl;
cout << "Size of long int : " << sizeof(long int) << endl;
cout << "Size of float : " << sizeof(float) << endl;
cout << "Size of double : " << sizeof(double) << endl;
cout << "Size of wchar_t : " << sizeof(wchar_t) << endl;
```

6- State the order of evaluation the operation in each of the following C++ statements, and show the value of x after each statement is performed.

```
a)  x = 7 + 3 * 6 / 2 - 1;
b)  x = 2 % 2 + 2 * 2  - 2 / 2;
```

7- Write equivalent C++ statements for given mathematical expressions

a) root = $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

b) z = $\frac{x + y}{x - y}$